Thin Layer Headspace Gas Chromatography for Biological Monitoring of Persons Exposed to Volatile Organohalogen Compounds From Water

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Thin layer headspace (TLHS) technique with autogenous generation of liquid sorbent has been evaluated in terms of its applicability to the determination of volatile organohalogen compounds (mainly trihalomethanes – THMs) in human urine and blood. In this technique, volatile analytes are stripped at elevated temperature from a thin film of a liquid sample flowing continuously on the walls of a so-called TLHS column driven by a stream of purified gas. In the process, the gas becomes saturated with water vapour. The gas is then directed to the second, smaller TLHS column kept at subambient temperature. The water absorbed in the gas condenses inside the column, and volatile analytes partition to the condensate according to their Henry’s law constants. This results in the analyte isolation from the complex matrix and their preconcentration. The aqueous extract (condensate) is analysed by direct injection onto a thick-film non-polar gas chromatographic column and electron capture detection. Basic characteristics of the method have been determined. The calibration plots were linear in the concentration range examined. Precision of the method was good, with RSD less than 22% for all analytes. The limits of detection were below 0.02 µg L⁻¹ for all analytes. The concentration factors did not differ significantly for water and urine samples, indicating little or no matrix effects. The method has been applied to the determination of THM levels in urine and blood in a group of volunteers. The results confirmed that these fluids can be used to monitor the exposure of individuals to THMs.

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